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DRAWINGS ATTACHED

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(54) NEW AND IMPROVED METHOD OF MAKING PLUGS FOR RADIATORS AND THE LIKE

(71) We, J. ADAMS & SONS (MANUFACTURERS) LIMITED, a British Company, of 90 Halesowen Street, Blackheath, Near Birmingham, in the County of Worcester, do hereby declare the invention for which we pray that a Patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a method of making plugs for radiators and the like of the type, hereinafter referred to as "of the type specified" comprising a cylindrical externally screw threaded portion and a wrench-engageable portion formed integrally therewith at one end thereof and comprising a plurality of flat surfaces defining a polygon and adjacent pairs of said surfaces intersecting each other at corners substantially parallel to and equidistant from the longitudinal axis of the plug.

Hitherto, plugs of the type described have been made in steel by a hot forging operation.

An object of the invention is to provide a new or improved method of making a plug of the type specified.

According to the invention we provide a method of making a plug of the type specified comprising, taking a blank of generally cylindrical configuration, positioning the blank in a die having a generally cylindrical part and a part of a shape corresponding to the shape of the wrench-engageable portion of the plug to be made, applying pressure to the blank to cause the blank to deform and to extrude into the part of the die corresponding to the shape of the wrench-engageable portion to form the cylindrical and wrench-engageable portions of the plug in a single application of pressure to the blank and then providing an external screw thread on the cylindrical portion.

The pressure may be applied to the blank by acting on the blank with a punch.

The punch may have a plane end face.

The plug may be formed with a recess in said externally threaded portion.

In this case the punch may be provided with a projection on its end face, the projection forming the recess in the threaded portion of the plug by causing backward extrusion of part of the material of the blank between the side of the projecting part and the walls of the die.

The blank may be coated with a suitable lubricant such as a coating of zinc phosphate and subsequent immersion in a hot aqueous soap bath.

The metal may be steel.

The wrench-engagable portion may be of square cross-section.

Alternatively, the wrench-engageable part may be of hexagonal cross-section.

The wrench-engagable part may be of smaller maximum cross-section dimension than the smallest cross-section dimension of the threaded portion.

One example of the invention will now be described in more detail by way of example with reference to the accompanying drawings wherein:

FIGURE 1 is a diagrammatic side elevation of a blank for use in the method according to the invention,

FIGURE 2 is a diagrammatic cross-sectional view showing one stage in a method according to the invention,

FIGURE 3 is a diagrammatic view partly in section, illustrating one stage in an alternative method according to the invention,

FIGURE 4 is a side elevation of a plug made according to the invention, and,

FIGURE 5 is an end elevation of the plug of Figure 4.

In this example, the manufacturer of a gas plug in accordance with British Standard Specification No. 1740 will be described.

Such plugs are intended for use as closure members in radiators and pipe systems. It should, however, be appreciated that the plugs may be used in other analogous applications.

A blank, illustrated at 10 in Figure 1, of cylindrical configuration, is cut from a length

of wire or rod stock. The stock is an EN1A steel. The black thus formed is then coated with zinc phosphate followed by immersion in a hot aqueous soap bath to provide a lubricant. The thus coated blank is then transferred to a die, illustrated at 11 in Figure 2. The die 11 has a first part 12 of cylindrical configuration of the shape to give the desired external configuration of the plug.

The die also has a portion 13 of a shape corresponding to the desired shape of the wrench-engagable portion of the plug. In the example under discussion the wrench-engagable portion is of square configuration in cross-section and so the part 13 defines a square cross-section aperture. If desired the wrench-engagable portion may be of hexagonal configuration instead in which case the parts would define an hexagonal in cross-section aperture.

In accordance with normal extrusion technique the part 13 of the die is of relatively short longitudinal extent to reduce friction between the die and the extrudate. After the blank has been placed in the part 12 of the die 11 pressure is applied to the blank by a punch 15 having a plain end face 16 to cause part of the blank 10 to extrude through the part 13 of the die, as shown in Figure 2.

When the desired amount of extrusion has been performed the punch 15 is withdrawn and an ejector member 17 is caused to act on the end of the wrench-engagable portion of the plug to eject the plug from the die.

As shown in Figure 3, if desired, the plug may be formed with a recess 18 in the threaded portion. In this case, the recess 18 is formed by acting on the blank in the die with a punch 19 having an axial projection 20 which causes the recess to be formed by causing backward extrusion of part of the material of the blank between the side wall 21 of the projection 20 and the side wall 22 of the part 12 of the die 11. According to British Standard specification No. 1740 a recess may be formed in the threaded part in plugs of 1" to 6" normal size.

Thus, as a result of the single cold extrusion operation described above, a plug, as illustrated in Figures 4 and 5, is produced. The plug has a wrench-engagable portion 23 of square shape in cross-section and a threaded portion 24 which may have a recess 18 formed therein, if desired.

The thread is formed on the external surface of the threaded portion 24 by means of a thread rolling operation and this thread rolling operation may cause the external shape of the threaded portion 24 to be tapered, as shown in Figure 4, with the largest diameter part closest to the wrench-engagable portion 23 of the plug.

It will be appreciated that the method of the present invention facilitates commercial manufacture of such plugs and considerably increases the rate at which the plugs are made. In addition, operation of the plant required to produce the plugs by the cold-extrusion process is much more simple than that required when performing a hot forging technique and so the labour costs may also be reduced. It has been found, for example, that with a hot forging technique, 1500 plugs could be made per day whereas with the cold-extrusion process of the present invention up to 10,000 plugs may be made per day.

WHAT WE CLAIM IS:—

1. A method of making a plug of the type specified comprising, taking a blank of generally cylindrical configuration, positioning the blank in a die having a generally cylindrical part and a part of a shape corresponding to the shape of the wrench-engageable portion of the plug to be made, applying pressure to the blank to cause the blank to deform and to extrude into the part of the die corresponding to the shape of the wrench-engageable portions of the plug in a single application of pressure to the blank and then providing an external screw thread on the cylindrical portion.

2. A method according to Claim 1, wherein the pressure is applied to the blank by acting on the blank with a punch.

3. A method according to Claim 2, wherein the punch has a plane end face.

4. A method according to Claim 1 or Claim 2, wherein the plug is formed with a recess in said externally threaded portion.

5. A method according to Claim 4 when dependent upon Claim 2, wherein the punch is provided with a projection on its end face, the projection forming the recess in the threaded part of the plug by causing backward extrusion of part of the material of the blank between the side of the projection and the wall of the die.

6. A method according to any preceding claim, wherein the blank is coated with a suitable lubricant prior to cold extrusion.

7. A method according to Claim 6, wherein said lubricant comprises a zinc phosphate coating followed by subsequent immersion in a hot aqueous soap bath.

8. A method according to any preceding claim, wherein the metal from which the blank is made is steel.

9. A method according to any preceding claim wherein the wrench-engageable portion of the plug is of square cross-section.

10. A method according to any one of Claims 1 to 8, wherein the wrench-engageable portion of the plug is of hexagonal cross-section.

11. A method according to any preceding claim, wherein the wrench-engageable portion is of smaller maximum cross-sectional dimension than the smallest cross-sectional dimension of the threaded part.

12. A method of making a plug of the type described substantially as hereinbefore

described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

13. A method of making a plug of the type described substantially as hereinbefore described with reference to and as shown in Figures 1, 3, 4 and 5 of the accompanying drawings.

14. A plug made in accordance with the method as claimed in any one of the preceding claims.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

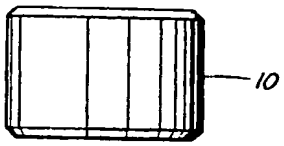

FIG. 1.

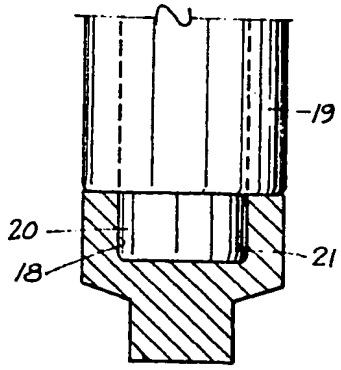

FIG. 3.

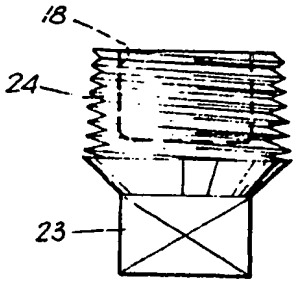

FIG. 4.

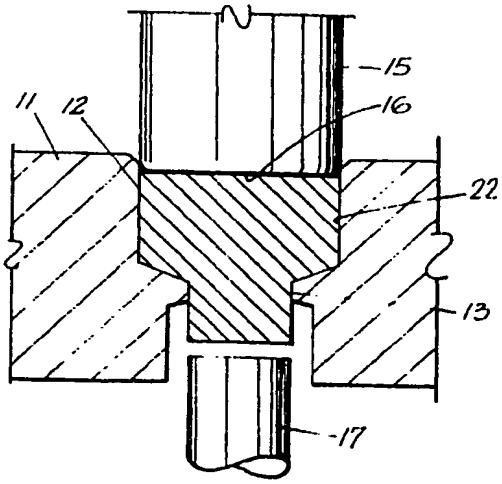

FIG. 2.

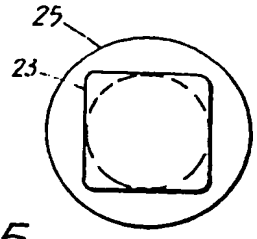

FIG. 5.